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people in the province, and many of the poorer men go to Khartum to work in the public service till they have money enough to buy some cattle and settle down in their own country.

The Nubas, all living in the southern hill country, have often been raided by the Baggara Arabs for slaves and cattle and were terribly harassed under the Dervish rule. Under the present régime, they are gradually settling down, though they raid one another, from time to time. They cultivate a great deal of land and have many cattle, sheep and goats.

The resources of Kordofan are considerable, but require time and population to develop them. All the main roads have now been cleared of bush, and a railroad is to be built from the Nile near Kosti to El Obeid, but at present all transport is by camels in the north and pack-bulls and donkeys in the south. The chief source of revenue is gum arabic, but, as yet, only a small part of the vast gum forests are being worked. The herds of camels and cattle are very important, but mineral resources are rather limited. Iron is plentiful and salt is found in considerable quantities. On the whole, Kordofan is fairly rich as countries go in Central Africa. The revenue is now about \$300,000 and the expenditures \$175,000, so that the province is paying its way and contributing its share to the central administration. It will be a generation or more before the enormous losses from battle and famine under the Mahdist despotism can be replaced, though there is now no tribe that cannot be described as fairly well off.

GEOGRAPHICAL RECORD

NORTH AMERICA

CALIFORNIA'S MINERAL OUTPUT IN 1909. Lewis E. Aubury, State Minerologist of California, informs the *Bulletin* that, subject to trifling alterations, the statistical mineral returns for the State, in 1909, exclusive of gold, silver and platinum, figures for which are being collected by the U. S. Census Bureau, will reach over \$61,324,000. The precious metals will bring the aggregate up to \$80,000,000 and probably more. The value of the total mineral production will exceed that of 1908 by about \$14,000,000. The value of the total output in 1907 was \$55,697,949; 1908, \$66,363,198; 1909, about \$80,000,000.

A large part of the advance of 1909 over 1908 was due to the increase in production and average price of petroleum. The output of petroleum in 1909 was 58,191,723 barrels valued at \$32,398,187. California, in 1908, led all the

States in petroleum production. Here are the quantities and values of the leading mineral products of California excepting gold, silver and platinum in 1909:

	QUANTITY.	VALUE.		QUANTITY.	VALUE.
Asphalt	136,664 tons	\$1,707,159	Macadam	3,567,120 tons	\$1,636,125
Borax	33,257,000 lbs.	1,163,960	Marble	79,600 cu. ft.	238,400
Cement	3,770,504 bbls.	4,954,210	Mineral Water....	2,419,834 gallons	462,488
Brick	333,846 M.	3,059,929	Natural Gas.....	1,147,502 M. cu.ft.	616,447
Clay (Pottery)....	299,424 tons	460,697	Pyrites.....	457,867 tons	1,389,802
Coal	49,389 tons	216,913	Petroleum.....	58,191 723 bbls.	32,398,187
Copper	64,841,654 lbs.	8,283,202	Quicksilver.....	16,174 flasks	771,657
Granite	358,008 cu. ft.	376,834	Rubble.....	1,948,658 tons	1,003,809
Lime	520,752 bbls.	577,824	Salt	124,110 tons	339,671
Limestone.....	337,676 tons	419,921			

SOUTH AMERICA

THE TRANS-CONTINENTAL RAILROAD IN SOUTH AMERICA. The first railroad crossing the continent of South America was completed on April 2nd last and, three days later, was opened to general traffic. It connects Buenos Aires and Valparaiso, the track passing through the Cumbre Pass of the Andes, a defile extending between Mts. Aconcagua and Juncal, at an elevation of 10,600 feet above the sea. On the Argentine side, the most serious engineering work was the approach to Cumbre Pass, the grade up the mountain sides being so steep that the Abt system of cogs and racks was introduced for the safe movement of trains which also pass through a number of very costly tunnels on the way to the summit grade. A wagon road was completed through the Cumbre Pass in 1902, but the culminating difficulties of joining the rail routes that slowly approached one another on the Argentine and Chilean sides were not surmounted until this year. The final stages of the work, however, were carried forward with unexpected rapidity. It was said by the engineers, last year, that the road would be opened, from sea to sea in June, 1910, but the opening really occurred two months earlier.

The difficulties in the mountain section were even greater on the Chilean side, and were especially centered in the digging of a tunnel, 16,613 feet long which has, for several years, delayed the completion of the road. To reach the summit of the railroad, passengers and freight from Valparaiso are now lifted to a height of 10,600 feet above the sea, though the distance from the port to the summit is only a little over 100 miles.

Whether or not the complete efficiency of the road as a freight carrier will be impaired by the fact that the cog and rack system was necessarily introduced on short parts of the line, the value of the road, both to Argentina and Chile will be very great. This rail line, 887 miles long, between the largest Atlantic and the largest Pacific port of South America, will practically put an end to the passenger traffic between these ports through the Strait of Magellan, 3,224 miles, or by way of the still longer route of Cape Horn. Most of the commercial exchanges between Argentina and Chile will probably be made by the rail route and it will be a great advantage to the latter republic that the wheat fields of Argentina are brought much nearer to her.

A NEW PORT IN ARGENTINA. The problem of adequate harborage in Argentina is paramount in the development of its commerce. Buenos Aires has been

extensively improved, the channel to Rosario has been dredged almost continuously for the past decade and a half, Bahia Blanca has been made into a fair port with good hope of becoming a first-class port, and still commercial outlets are required. A new venture, and a most promising one, is now before us. On the north side of Samborombon Bay, near Punta de las Piedras, on the S. side of the Rio de la Plata, "Puerto Argentino" is to be constructed. It is to be completed in five years and will be a deep-sea harbor allowing boats drawing 30 feet to enter at ordinary low tide. (*Con. and Trade Rep.*, July 11, 1910, No. 10.) It is to be built by the Port Argentine Great Railways Company, capitalized at nearly \$60,000,000. The total length of the entrance channel will be nearly 50,000 feet and not less than \$15,572,000 must be spent upon it; the docks will be 1,640 feet apart, 3,215 feet long and 1,050 feet wide, with a storage capacity of 100,000 tons which represents a movement of 800,000 tons a year. Goods will be transferred directly from ship to railway car. The motive power will be electricity. A model city will be built around the port with hotels, bathing beach, etc. In addition a dry dock will be built of sufficient size to accommodate the two new Dreadnoughts now being built for the Argentine navy in the United States. Dredges will at once begin work on the project and it is safe to say that in a few years the port will be in running order, for it is one of the most crying needs of commercial Argentina to-day. ISAAH BOWMAN.

AFRICA

THE FRENCH IN WADAI. The French forces that have, for some time, been extending their occupancy and surveys in the central Sudan, have been considerably embarrassed by the opposition of the Sultanate of Wadai, a large territory, on the border of the Sahara, to the east of Lake Chad. Some of the French parties, not far from the Wadai border, were attacked by the natives. The French Government finally decided to occupy the Sultanate. In June last year, the French succeeded, with little difficulty, in taking possession of Abesher, the capital of Wadai, and no serious reverse was suffered till January last when Captain Fiegenschuh, who had commanded the operations in Wadai and established a garrison at Abesher, was attacked by an overwhelming force at the Tautil wells, in the territory of the Messalit tribe, and he, with two officers and 100 Senegalese soldiers, were killed to a man.

In other parts of Wadai, according to *L'Afrique française*, the French have met with little opposition. Lieut. Delacommune reports that, seven weeks after the occupancy of Abesher, he started from the capital with a small force and made a journey throughout the Sultanate, finding the conditions everywhere peaceful; and although the people were afraid of him, for this was their first meeting with a white man, they evinced a desire to be on friendly terms with the new régime. He says he passed through a very fertile country where large villages were thickly sprinkled and great fields of grain and fine herds of cattle were everywhere seen. The French have taken large quantities of firearms from the natives.

Apparently, most of the people of Wadai living under the rule of their Sultan Dudmurra, are better than the reputation the French had given them; but such a catastrophe as that of January last is not a surprising incident in the

course of operations to bring a large and strong people under subjection to foreign rule.

LIEUT. BOYD ALEXANDER KILLED. Lieutenant Boyd Alexander, known for his important scientific explorations in Africa, was killed by natives in the Soudan, on April 2.

WIRELESS TELEGRAPHY AT ZANZIBAR. Zanzibar has long felt the inconvenience of having no means of quick communications with the island of Pemba, about 70 miles to the north of the port of the larger island. This is due to the fact that Pemba is the largest source of the world's supply of cloves and the business of cultivating and marketing the spice is carried on entirely from Zanzibar. Some years ago, an attempt was made to establish a carrier pigeon service between the two islands but the hoped-for results were not realized. In December, 1907, the Lodge-Muirhead system of wireless telegraphy was installed, the stations being erected near the port of Zanzibar and Chake-Chake, the chief town of Pemba. The experiment has been very successful and the interests of the clove trade are being well served by the wireless system. The men engaged in the raising and marketing of cloves say they are glad to support the service for the advantages it gives them. (*Globus*, Vol. 97, p. 179, 1910.)

AUSTRALASIA AND OCEANIA

PIGMIES IN NEW GUINEA. The London *Times* (Weekly Edition, June 10, 1910), reports that the committee appointed by the British Ornithologists' Union to explore the snow mountains in Dutch New Guinea has reached its field of inquiries and has sent the information that, at an elevation of 2,000 feet, it discovered a tribe of pigmies, in the far interior of the island, whose average height is about 4 ft. 3 in. More definite details have not been received but there can be little doubt that they belong to the Negrito family. Anthropologists had widely accepted the view that the Negritos were not to be found in the Papuan sub-region, but their occurrence there now seems to be proven and the present discovery is likely to account for the presence of various anomalous races in the remoter parts of the Lesser Sunda Islands. Hitherto, these people have been known to inhabit only three widely separated regions—the Andaman Islands in the Bay of Bengal, the northern portion of the Malay Peninsula, where they are known as Semangs, and certain areas in the Philippine Islands, especially in the northern island of Luzon. Further details of this important discovery will be awaited with interest.

EDUCATIONAL GEOGRAPHY

GEOGRAPHY IN THE HIGHER SCHOOLS. According to Dr. Hermann Wagner's latest collection of data (*Geographischen Jahrbuch*, Vol. 32, 1909, pp. 439-446), there are 233 teachers of Geography in the higher schools of Europe and the other continents distributed among 131 institutions. As a university study, Geography is not yet a century old. Karl Ritter was the first professor of Geography, a chair being established in the University of Berlin in 1825 with this famous scholar as its occupant. In his "Methodik der Erdkunde" for 1842, J. E. Lüdde reported that in the summer semester of 1841, lectures on Geography had been given in the universities by Ritter in Berlin, Mendelssohn in Bonn, Fröbel in Zürich, Wappäus in Göttingen, Kutzen in Breslau, and Haug in

Tübingen. In 1871, about the same time that the new German Empire came into existence, chairs of Geography were established in nearly all the German Universities. In 1909, there were 54 teachers of Geography in 31 of the higher schools of Germany. All the German Universities, excepting those of Jena and Rostock, then maintained professorships of Geography. The study was fully represented also in the technical high schools of Aachen, Danzig, Darmstadt, Dresden, Munich, Stuttgart, the four commercial high schools of Berlin, Cologne, Frankfort on Main and Mannheim, the academy in Posen and the new Colonial Institute in Hamburg.

Next to Germany, the largest number of teachers of advanced Geography are found in Austria-Hungary, Switzerland, France, Italy, Belgium, Great Britain and Russia. The only European states without them are Greece and Turkey. In Great Britain, geographical progress has been marked, in recent years, and in 1909 there were chairs of Geography in Edinburgh, Glasgow, Sheffield and Aberystwyth, Wales. [Oxford now has a professorship of Geography.] "In the United States, the teaching of Physical Geography is in the hands of the Geologists and Geography, as such, has been assigned, only to a very small extent, to the care of specialists."

POLAR

COAL PRODUCTION IN SPITZBERGEN. The British Vice-Consul at Bergen, Norway, reports (*Bd. of Trade Jour.*, No. 707 June 10, 1910), that the Trondhjem-American Coal Co., otherwise known as the Arctic Coal Company, mined 7,500 tons of coal last winter. Work was directed, however, not so much to obtaining coal as to pushing the works beyond reach of the frost, and the main level is now about a half mile long. Work, this summer, is to be devoted entirely to the installation of machinery and regular coal mining will begin in October next. The production of coal, next summer, is expected to be 50,000-60,000 tons, all of which will be sent to Norway. The manager says that the coal is of excellent quality and that it may be mined at a small but reasonable profit.

DR. CHARCOT'S ANTARCTIC EXPEDITION. Dr. Bruce has sent to the *Scottish Geographical Magazine* (June, 1910), some further information concerning the scientific observations of the Charcot expedition. A series of soundings seem to show that the continental plateau in the neighborhood of Graham Land has a very irregular surface while Peter I Land apparently rises very abruptly from the ocean depths. A shallowing in Lat. 70° S. and Long. 119° W. perhaps indicates the vicinity of land, while a sounding of over 5,000 meters in Lat. 66° S. and Long. 118° W. indicates the presence here of a deep depression of the ocean floor.

LIEUT. FILCHNER'S ANTARCTIC PLANS. The *Zeitschrift* of the Geographical Society of Berlin (1910, No. 3), reports on the aims of the projected German Antarctic Expedition as announced by its leader, Lieut. Filchner. He has planned the undertaking, on the theory that the Antarctic land mass may be found to be divided into two parts by an arm of the ocean connecting Ross Sea on the Pacific, with Weddell Sea on the Atlantic side of Antarctica. *Nature* (May 12, 1910), commenting on the idea, says that "this possibility, and also the view that the Antarctic land south of the Pacific consists only of an archipelago, must have occurred to all who carefully considered the results collected by the expeditions

of Captain Scott and Sir Ernest Shackleton. The meteorological evidence and the apparently well-marked westward trend of the land which drove Sir Ernest Shackleton upon the South Polar plateau seem, however, not very favorable to the idea of the direct connection of the Ross and Weddell Seas. Indications of any such connection might also have been expected from the tidal observations of the *Discovery*." It is hoped that this question, which Prof. Penck has declared to be much more important than the discovery of the pole, will be settled by Lieut. Filchner by direct observation. There seems little doubt that funds will be raised for his enterprise. One unnamed donor has given 300,000 marks.

PHYSICAL GEOGRAPHY

EVOLUTION AND OUTLOOK OF SEISMIC GEOLOGY. Prof. W. H. Hobbs has recently shown (*Proc. Amer. Phil. Soc.* Vol. XLVIII, 1909, 1-44) that the natural development of seismology was long retarded by Mallet's theory of the centrum. The tectonic conception of earthquakes began with Suess in 1872. Various studies of faulting associated with earthquakes have led to the establishment of the fault block theory. The great work of de Montessus de Ballore culminates this development. The relation of earthquakes to volcanoes has not been well defined until recent times, and the conditions of earth strain during the growth of block mountains is still under discussion.

The outlook in seismology "indicates two lines of effort to be followed up. These are (1) to make practical application of the knowledge already gained, and (2) to investigate with every possible improvement in method until we have so laid bare the law of seisms that we may forecast the time, the place, and the probable severity of future earthquakes with at least as much accuracy and forewarning as is now possible in weather prediction." Earthquake forecasts, earthquake cycles, and possibilities of future prognostication are reviewed.

CLIMATOLOGICAL WORK OF THE WEATHER BUREAU. Some of the important problems in climatology which the Weather Bureau has under investigation are described by Professor F. H. Bigelow in the *Monthly Weather Review* for November, 1909. New charts of mean monthly and mean annual temperatures, reduced to homogeneous systems, are being constructed and published, which will make possible a far more accurate study, both of current temperatures and of temperature-departures. A new form of snow-bin, designed to give a fair catch of snow in mountainous districts which can be visited only at intervals, and to store the snow and rain until it can be measured, is being experimented with. The relation between runoff, seepage, discharges, floods, lags and flood-forecasts is being studied. Evaporation is being investigated at the Salton Sea, and elsewhere, and a formula is being developed which it is believed "will be applicable in all climates."

Problems connected with the general circulation of the atmosphere, especially in connection with seasonal forecasts; with the measurement of solar radiation, and economic questions relating to the damage done by floods, winds and waves are also suggested as important subjects for thorough investigation.

R. DEC. WARD.

FORESTS, CLIMATE AND FLOODS. Prof. Willis L. Moore, Chief of the Weather Bureau, has made a report on "The Influence of Forests on Climate and on

Floods" to the Committee on Agriculture of the House of Representatives. This report has been published as a pamphlet (Washington, D. C., 1910, Government Printing Office), and widely distributed. It appears, from a *Note* which is printed on the outside of the front cover, that the present argument resulted from a request of the chairman of the committee that Professor Moore should submit further information on this subject, the latter having already given some evidence before the same committee in 1909. That portion of the report which deals with forests in their influence upon climate is on the whole a fair presentation of the views generally held by meteorologists, but, in his discussion of the effects of forests and of deforestation upon floods and run-off, the author cannot be said to have stated the opinions which the majority of engineers maintain in this matter.

R. DEC. WARD.

WIND OBSERVATIONS IN RELATION TO AERONAUTICS. That progress in meteorology means progress in aeronautics is a statement the truth of which few will care to challenge. Similarly, progress in aeronautics means progress in meteorology. The study of meteorological data which may be of practical use in aeronautics is advancing rapidly. Thus, in Germany, at the request of the "Motorluftschiff-Studiengesellschaft" of Berlin, Professor Assmann has recently completed an analysis of the wind data available for the Empire (*Die Winde in Deutschland*, Braunschweig, 1910, pp. 48). The percentage of frequency of wind from the eight principal directions is given for about fifty stations for the twenty years 1886-1905, together with a subdivision of winds from each direction according to estimates made on the Beaufort scale, and not as determined by the anemometer.

For Italy there is also a new publication on winds, prepared at the request of the Italian Aeronautical Society by Dr. Filippo Eredia, of the Central Meteorological Office (*I Venti in Italia*, Rome, 1909), and printed in the *Rivista Tecnica di Aeronautica Italiana*. Data are given for 111 stations as to wind direction, and a series of colored plates shows the results graphically. That such studies as these two will prove of great practical importance to those who are interested in aeronautics is obvious, and they will be equally important to meteorologists and climatologists.

R. DEC. WARD.

Corrigenda. As the author was unable to revise the final proof of the paper, "The Caverns and People of Northern Yucatan" (*Bulletin*, Vol. XLII, No. 5, May, 1910, pp. 321-326), certain errors need correction:

p. 323, explanation of Fig. 2, in third line change, "see Fig. 7" to read "see Fig. 9."

p. 325, explanation of Fig. 8, change the first word, "when," in line 7 to "where."

p. 325, third line below figure, change "Figure 4" to read "Figure 5."

p. 325, third line from bottom, change "Fig. 5" to read "Fig. 6."

p. 326, line 17, sentence beginning "Figure 3," change to read "Figure 4 may be taken to represent a section of the Ikil cenote, and Figure 3 as an intermediate stage," etc.

p. 330, explanation of Fig. 11, change "Photo by E. H. Thompson" to read "Photo by H. E. Sargent."

p. 333, explanation of Fig. 14, for "E. J. Thompson" read "E. H. Thompson."

p. 334, line 22, for "day" read "dry."